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EXAMINER

PHAM, THANHHA S

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 07/16/2003

16

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/752,685

Applicant(s)

TRAPP, SHANE J.

Examiner

Thanhha Pham

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-- Th MAILING DATE of this communication appears on the cov r sheet with th correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1:704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-13, 15-25, 36-39, 41-46 and 64-70 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13, 15-25, 36-39, 41-46 and 64-70 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

This Office Action responses to Applicant's Amendment in Paper No. 15 dated 4/23/03.

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### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

- 1. Claims 36-39 and 41-46 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

With respect to claim 36,

It is not clear how to form a pair of adjacent gate stacks in said insulative film and forming sidewall spacers on sidewalls of said adjacent gate stacks. How are sidewall spacers formed on the sidewalls of the gate stacks when the gate stacks are in the insulating layer?

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**2. Claims 1, 3-12, 15-18 and 20-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Ding et al [US 5,814,563].**

**Notice:** *This rejection is based on the situation that "consisting essentially of" is construed as equivalent to "comprising". See MPEP 2111.03, In re Herz, 537 F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976) (emphasis in original) (Prior art hydraulic fluid required a dispersant which appellants argued was excluded from claims limited to a functional fluid "consisting essentially of" certain components. In finding the claims did not exclude the prior art dispersant, the court noted that appellants' specification indicated the claimed composition can contain any well-known additive such as a dispersant, and there was no evidence that the presence of a dispersant would materially affect the basic and novel characteristic of the claimed invention. The prior art composition had the same basic and novel characteristic (increased oxidation resistance) as well as additional enhanced detergent and dispersant characteristics.). For the purposes of searching for and applying prior art under 35 U.S.C. 102 and 103, absent a clear indication in the specification or claims of what the basic and novel characteristics actually are, "consisting essentially of" will be construed as equivalent to "comprising."*

➤ With respect to claims 1, 3-4, 8-12 and 15-18, Ding et al, figs 1-7 and col 1-13, discloses a method of forming an opening in an insulating layer (20, fig 1d) formed over a substrate (25,32,34, 36, fig 1d) in a semiconductor device comprising etching said insulative layer with an etchant composition consisting essentially of ammonia (NH<sub>3</sub>) and at least one of fluorocarbon (CHF<sub>3</sub> and CF<sub>4</sub>) so as to form said opening wherein flow rate ratio of said at least one fluorocarbon to said ammonia is from about 4:1 to about 10:1 and said flow rate of said ammonia is at least about 2 sccm (col 11-12) [claims 1, 9-11 and 15-18]; said etching includes plasma etching [claim 3], is performed through a patterned photoresist mask [claim 8] without forming an etch stop [claim 12], and is performed at a temperature range of about -50 to about 80°C (see examples) [claim 4].

➤ With respect to claim 5, Ding et al discloses the etching is performed within a range temperature of about 0-50°C (e.g. 50oC, col 6 lines 51-67).

➤ With respect to claims 6-7, Ding et al discloses the etching is performed at an operating pressure of about 40-50 mTorr (e.g. 50 mTorr, col 5 lines 45-65).

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- With respect to claims 20-21, Ding et al discloses the etching is performed at the flow rate of  $\text{CF}_4$  of about 15-20 sccm (e.g 18 sccm, col 10 lines 31-33).
- With respect to claims 22-23, Ding et al discloses the etching is performed at the flow rate of  $\text{CHF}_3$  of about 35-45 sccm (e.g. 40 sccm, col 10 lines 24-26).

**3. Claims 1, 3-5, 8-10, 12, 15-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Toshiharu Yangida [JP 09-260350].**

Toshiharu Yangida, figs 2's and text paragraph [0001]-0052], discloses the claimed method of forming an opening in an insulating layer (30, fig 2(a)) formed over a substrate (6) in a semiconductor device comprising etching said insulative layer with an etchant composition consisting essentially of ammonia ( $\text{NH}_3$ ) and at least one of fluorocarbon ( $\text{C}_4\text{F}_8$ , text paragraph [0032]-[0035]) so as to form said opening wherein flow rate ratio of said at least one fluorocarbon to said ammonia is from about 3:1 to about 20:1 and said flow rate of said ammonia is at least about 2 sccm [claims 1, 9-10 and 15-16]; said etching includes plasma etching [claim 3], is performed through a patterned photoresist mask [claim 8] without forming an etch stop [claim 12], and is performed at a temperature range of about 0 to about  $50^\circ\text{C}$  ( $5^\circ\text{C}$ ) [claims 4-5].

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**4. Claims 1-13, 15-25, 36-39, 41-46 and 64-70, as being best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Tan et al [US 6,140,168] in view of Ding et al [US 5,814,563].**

Tan et al, figs 1's and col 1-4, discloses a method for forming a self-aligned contact opening (124, fig 1D) in an insulative layer (114b) formed over a substrate comprising steps:

providing the substrate (100, fig 1A) comprising adjacent gate stacks being formed thereon, the adjacent gates stacks comprising opposed side wall spacers (108) which have been formed over the adjacent gate stacks *[claims 13, 36, 64]*;

forming the insulative layer (114, fig 1B) over the substrate, the adjacent gate stacks and the side wall spacers which have been formed over the adjacent gate stacks *[claims 13, 36 and 64]*;

forming a patterned photoresist mask layer (116, fig 1B) over said insulative layer *[claims 8 and 36]*;

contacting and etching the insulative layer through an aperture (120, fig 1C-1D) in the patterned photoresist mask layer using a plasma etchant mixture *[claim 3]* comprising fluorocarbon (CHF<sub>3</sub> and CF<sub>4</sub>, col 3 lines 42-55) *[claims 9-11, 18, 36, 66]* so as to form the self-aligned contact opening (124, fig 1D) without an etch stop *[claims 12, 42, 64]* in the insulative layer located between the adjacent gate stacks and the opposed side wall spacers aligning the self-aligned contact opening to the substrate *[claims 2, 13, 43]*, wherein said sidewall spacers are not etched and defines at least in part of said self-aligned contact opening (fig 1D) *[claims 13 and 64]*;

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removing the patterned photoresist mask layer after said contacting and etching  
[claim 46].

➤ With respect to claims 1-4, 8-13, 18, 36-39, 42-44, 46, 64, 66 and 69, Tan et al does not teach: **1)** using the plasma etchant mixture essentially consisting of ammonia and said fluorocarbon of a ratio flow rate of the fluorocarbon to ammonia of 2:1 to 40:1 with the flow rate of said ammonia of at least about 2 sccm to form the self-aligned contact opening at a temperature of about  $-50$  to  $80^{\circ}\text{C}$  with further forming a protective layer over the opposed side wall spacers of the adjacent gate stacks; and **2)** depositing a conductive plug inside said self-aligned contact such that said conductive plug is separated from said side opposed side wall spacers by said protective layer.

Regarding to **1)**, Ding et al teaches using ammonia in addition to fluorocarbon with the flow rate ratio of the fluorocarbon to ammonia of 2:1 to 40:1 and the flow rate of ammonia of at least about 2 sccm for plasma etching the insulative layer at a temperature of about  $-50$  to  $80^{\circ}\text{C}$  would provide a better etch process with a high etch rate and an improved etch selectivity (see col 5-12). Ding et al also teaches using the plasma etchant mixture consisting essentially fluorocarbon and ammonia would form an opening with a protective layer being formed on sidewall of the opening (fig 1b or 1d). Therefore, it would have been obvious for those skilled in the art to modify the process of Tan et al by using the plasma etchant mixture essentially consisting of ammonia and said fluorocarbon with the flow rate ratio and temperature as being claimed, per taught by Ding et al, to etch the self-aligned contact with a better etch rate and improved etch selectivity without an etch stop. In addition, those skilled in the art would recognize that

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combination of the process of Tan et al in view of Ding et al will form a protective layer containing nitrogen over the opposed side wall spacers in the self-aligned contact opening.

~~Regarding to 2), depositing the conductive plug inside the self-aligned contact opening~~ is known in the art for forming electrical connection in a semiconductor device. In addition, Tan et al teaches forming a self-aligned contact opening is for forming electrical connection between source/drain region and metal layer [see col 2 lines 15-23). It would have been obvious for those skilled in the art to modify the process of Tan et al in view of Ding et al by depositing the conductive plug inside the self-aligned contact opening wherein the conductive plug separated from the sidewall spacers by the protective layer since the usage of the plasma etchant mixture consisting essentially of ammonia ( $\text{NH}_3$ ) and at least one of fluorocarbon to provide electrical connection between source/drain region to certain location of the semiconductor device to operate the device.

➤ With respect to claim 19, Tan et al (col 3 lines 42-50) teaches using the fluorocarbons essentially consisting of  $\text{CF}_4$  and  $\text{CHF}_3$  for etching the insulative layer. Ding et al teaches  $\text{C}_2\text{H}_2\text{F}_2$  can be added to the fluorocarbon mixture for etching the insulative layer. Therefore, it would have been obvious for those skill in the art to use the fluorocarbon mixture comprising  $\text{CF}_4$ ,  $\text{CHF}_3$ , and  $\text{CH}_2\text{F}_2$  to etch the insulative layer in the process of Tan et al in view of Ding et al. In addition, using the fluorocarbons comprising  $\text{CF}_4$ ,  $\text{CHF}_3$  and  $\text{CH}_2\text{F}_2$  has been known in the art for etching the insulative layer. The selection of a known material based on its suitability for its intended use



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supported a prima facie obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). "Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig - saw puzzle." 65 USPQ at 301.).

➤ With respect to claims 4-7, 15-17, 20-25, 39, 41, 44-45, 65-70, claimed ranges of temperature, flow rates, flow rate ratios in the etching step, absent evidence of disclosure of criticality for the range giving unexpected results are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art. As noted in *In re Aller* 105 USPQ233, 255 (CCPA 1955), the selection of reaction parameters such as temperature and concentration would have been obvious. See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

**5. Claims 2, 6-7, 11-13, 15-18, 36-39, 41-46 and 64-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toshiharu Yanagida [JP 09-260350] in view of Tan et al [US 6,140,168].**

➤ With respect to claims 2, 12-13, 36-38, 42-45, Toshiharu Yanagida, figs 1's and text [0001]-[0052] substantially discloses the claimed method of forming a contact opening in an insulative layer (3, fig 1(a)) formed over a substrate in a semiconductor device comprising: etching said insulative layer with an etchant composition consisting essentially of ammonia (NH<sub>3</sub>) and at least one of fluorocarbon (C<sub>3</sub>F<sub>8</sub>, text paragraph

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[0032]-[0035]) so as to form said opening wherein flow rate ratio of said at least one fluorocarbon to said ammonia is from about 2:1 to about 40:1 and said flow rate of said ammonia is at least about 2 sccm; said etching is performed through a patterned photoresist mask in a reaction chamber, without forming an etch stop, and at a temperature range of about 0 to about 50°C (5°C).

Toshiharu Yanagida generally teaching forming the contact opening to the impurity diffusion region (2) of the semiconductor device. Toshiharu Yanagida does not expressly teach a pair of adjacent gate stacks with sidewall spacers on sidewalls of said adjacent gate stacks being formed in said insulative layer and said etching forming said opening as a self-aligned contact opening between the two adjacent gate stacks wherein said sidewall spacer defining at least a part of the self-aligned contact opening.

However, forming such as self-aligned contact opening in the insulative layer has been known in the art. See Tan et al as an evidence that shows: forming the pair of adjacent gate stacks with the sidewall spacers on the sidewalls of said adjacent gate stacks in the insulative layer (114); and etching the self-aligned contact opening (figs 1B-1D) between the two adjacent gate stacks in the insulative layer (114) wherein said sidewall spacer defining at least a part of the self-aligned contact opening.

Therefore, it would have been obvious for those skilled in the art to modify process of Toshiharu Yanagida by forming the pair of adjacent gate stacks in the insulative layer and etching the self-aligned contact opening as being claimed, per taught by Tan et al, to form the self-aligned contact opening to the impurity diffusion of

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source/drain region located between the two adjacent gate stacks as a design of the semiconductor device is needed.

➤ With respect to claims 11 and 18,  $\text{CF}_4$ ,  $\text{CHF}_3$  and  $\text{CH}_2\text{F}_2$  are known etchants for etching the insulative layer. It would have been obvious for those skilled in the art to select any two of these three etchant to etch the insulative layer for forming the contact opening in the semiconductor device. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). "Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig - saw puzzle." 65 USPQ at 301.). See Tan et al as an evidence that uses two of the three etchants of  $\text{CF}_4$ ,  $\text{CHF}_3$  and  $\text{CH}_2\text{F}_2$  to etch the contact opening in the semiconductor device.

➤ With respect to claims 64, 69 and 70, Toshiharu Yanagida, figs 1's and text [0001]-[0052] substantially discloses the claimed method of forming a contact opening in an insulative layer (3, fig 1(a)) formed over a substrate in a semiconductor device comprising: contacting/etching said insulative layer with a plasma etchant mixture consisting essentially of ammonia ( $\text{NH}_3$ ) and at least one of fluorocarbon ( $\text{C}_3\text{F}_8$ , text paragraph [0032]-[0035]) so as to form said contact opening wherein flow rate ratio of said at least one fluorocarbon to said ammonia is from about 2:1 to about 40:1 and said flow rate of said ammonia is at least about 2 sccm; said etching is performed at a pedestal temperature of about 0 to about  $50^\circ\text{C}$  ( $0^\circ\text{C}$ ) and without an etch stop.

Toshiharu Yanagida generally teaching forming the contact opening to the impurity diffusion region (2) of the semiconductor device. Toshiharu Yanagida does not expressly teach:

**1) forming said contact opening as a self-aligned contact opening defined at least in part by sidewall spacers on adjacent gate stacks in the insulative layer wherein the etching further forms a protective layer of a nitrogen containing layer over opposed sidewall spacers of the adjacent gate stacks; and**

**2) depositing a conductive plug inside said etched opening such that said conductive plug is separated from said sidewall spacers by said protective layer.**

Regarding to **1)**, Tan et al (figs 1's and col 1-3) teaches forming the self-aligned contact opening defined at least in part by the sidewall spacers (108, fig 1D) on the adjacent gate stacks in the insulative layer (114). Therefore, it would have been obvious for those skilled in the art to modify process of Toshiharu Yanagida by forming the self-aligned contact opening defined at least in part by the sidewall spacers on the adjacent gate stacks to provide appropriate contact to the impurity diffusion region of source/drain between the adjacent gate stacks as a demand of the designed semiconductor device is needed. It would also obvious for those skilled in the art to recognize that the combination of process of Toshiharu Yanagida and Tan et al would provide the protective layer of nitrogen containing layer over the opposed sidewall spacers of the adjacent gate stacks since the usage of the plasma etchant mixture consisting essentially of ammonia ( $\text{NH}_3$ ) and at least one of fluorocarbon.

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Regarding to **2**), depositing the conductive plug inside the self-aligned contact opening is known in the art for forming electrical connection in a semiconductor device. In addition, Tan et al teaches forming a self-aligned contact opening is for forming electrical connection between source/drain region and metal layer [see col 2 lines 15-23). It would have been obvious for those skilled in the art to modify the process of Toshiharu Yanagida by depositing the conductive plug inside the self-aligned contact opening, as being claimed, per taught by Tan et al, to provide electrical connection between source/drain region to certain location of the semiconductor device to operate the device. The combination process of Toshiharu Yanagida would provide the conductive plug separated from the sidewall spacers by the protective layer since the usage of the plasma etchant mixture consisting essentially of ammonia (NH<sub>3</sub>) and at least one of fluorocarbon would provide the protective layer on the opposed sidewall spacers of the adjacent gate stacks.

➤ With respect to claims 6-7, 15-17, 39, 41, and 65-68, claimed ranges of flow rate ratio, flow rate of ammonia and pressure for etching, absent evidence of disclosure of criticality for the range giving unexpected results, are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art. As noted in *In re Aller* 105 USPQ233, 255 (CCPA 1955), the selection of reaction parameters such as temperature and concentration would have been obvious. See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re*

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*Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).*

**6. Claims 19-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toshihura Yanigada [JP 06-260350] in view of Tan et al [US 6,140,168] as applied to claim 18 above, in further view of Blalock et al [US 5,286,344].**

Toshihura Yanigada in view of Tan et al substantially discloses the claimed method except teaching using the fluorocarbons comprising  $\text{CF}_4$ ,  $\text{CHF}_3$  and  $\text{CH}_2\text{F}_2$  for etching the insulative layer.

However, Bablock et al teaches using the fluorocarbons comprising  $\text{CF}_4$ ,  $\text{CHF}_3$  and  $\text{CH}_2\text{F}_2$  for etching the insulative layer.

Therefore, it would have been obvious for those skilled in the art to modify process of Toshihura Yanigada in view of Tan et al by using the fluorocarbons of  $\text{CF}_4$ ,  $\text{CHF}_3$  and  $\text{CH}_2\text{F}_2$ , as known selected etchants per taught by Bablock et al, to etch the insulative layer for forming the contact opening. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). "Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig - saw puzzle." 65 USPQ at 301.).

➤ With respect to claims 20-25, claimed flow rates of fluorocarbons, absent evidence of disclosure of criticality for the range giving unexpected results, are considered to involve routine optimization while has been held to be within the level of

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ordinary skill in the art. As noted in *In re Aller* 105 USPQ233, 255 (CCPA 1955), the selection of reaction parameters such as temperature and concentration would have been obvious. See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

### ***Response to Arguments***

**7. Applicant's arguments filed 4/23/03 have been fully considered but they are not persuasive.**

➤ Regarding to Applicant's argument on pages 6-8, Applicant disagrees with the Office Action's assertion that "consisting essentially of" is construed as equivalent to "comprising" in support of MPEP 2111.03 and in *In re Herz*, 537 F.2d 549,551-52 (CCPA 1976). Applicant argues that *In re Herz* does not stand for such a broad proposition as the Office Action's asserts. Applicant argues that "Applicant's invention excludes any additional neutral etchants, ionic etchants, oxygen or carbon added to the fluorocarbon mixture.

Applicant's argument is not persuasive because *In re Herz* does stand for the Office Action's asserts that "consisting essentially of" is construed as equivalent to "comprising" when addition of oxygen, carbon or inert gas component to the etchant mixture of ammonia and at least one of fluorocarbon does not materially affect the basic and novel characteristics of the etchant mixture. See *In re Herz*, "...In finding the claims

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*did not exclude the prior art dispersant, the court noted that appellants' specification indicated the claimed composition can contain any well-known additive such as a dispersant, and there was no evidence that the presence of a dispersant would materially affect the basic and novel characteristic of the claimed invention. The prior art composition had the same basic and novel characteristic (increased oxidation resistance) as well as additional enhanced detergent and dispersant characteristics.)".*

In this situation, Applicant's specification indicated that the claimed composition (essentially consisting of ammonia and at least one or more fluorocarbon) can contain any well known additive such as oxygen, carbon or inert element components (see Applicant's specification on page 10 lines 10-13). Since there is no evidence that the presence of addition of oxygen, carbon or inert element components would materially affect the basic and novel characteristics of the claimed etchant composition of ammonia and at least one fluorocarbon, the prior art etchant composition of Ding of ammonia and at least one of fluorocarbon has the same basic and novel characteristics of the Applicant's etchant composition as well as additional of carbon, oxygen and inert element components.

➤ Regarding to Applicant's argument on pages 11-12 that "***Tan and Ding are not properly combinable ..... Tan also teaches that an undoped dielectric layer 114 is ion implanted in forming the self-aligned contact opening.... Tan teaches away from forming a contact opening in surrounding doped layer. In constrast, ...., Ding teaches using three gases to etch a dielectric layer that is entirely doped'***", the argument is not persuasive because both Tan and Ding uses fluorocarbons for etching the insulative layer for forming contact opening. Ding sees advantage of using ammonia in addition to fluorocarbon in etching the insulative



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layer (the same as Applicant's invention) to improve etching rate (col 5 lines 51-53) thus preventing an etch stop (col 6 and fig 1d). Therefore, it is combinable to modify the teaching of Ding to the process of Tan to improve the process of etching the insulative layer for forming the contact opening, particularly the self-aligned contact opening. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

### **Conclusion**

2. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanhha Pham whose telephone number is (703) 308-6172. The examiner can normally be reached on Monday-Thursday 8:00 AM - 7:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr, can be reached on (703) 308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-3432 for regular communications and (703) 308-7725 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Thanhha Pham  
July 7, 2003

  
CARL WHITEHEAD, JR.  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800